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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/729,661

12/05/2003

David H. Shen

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04/04/2005

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EXAMINER

LE, DINH THANH

ART UNIT

PAPER NUMBER

2816

DATE MAILED: 04/04/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/729,661	Applicant(s) DAVID H. SHEN	
	Examiner DINH T. LE	Art Unit 2816	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>12/5/03</u> . | 6) <input type="checkbox"/> Other: ____.  |

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**DETAILED ACTION*****Drawings***

Figure 1 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the recitation "inductors are based on bonding wires" in claim 5, "the main L-C filter is a ladder filter" in claim 7, "the digital filter is implemented by a counter" in claim 17, "the L-C filters includes resistors" in claim 18, "voltage is used to control multiple L-C filter networks" in claim 22 and the "circuits are fully differential or single ended" in claims 23-24 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must

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be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Specification***

The specification has been checked to the extent necessary to determine the presence of all possible minor errors. However, the applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: The recitation "the digital loop filter is implemented by a digital counter" as recited in claim 17 lacks antecedent basis in the present specification.

### ***Claim Objection***

Claim 1 is objected to in that "A" on lines 3, 6, 7, 9, 12 and 14 should be corrected as – a' for correcting the typo error. Correction is required.

Claims 1-24 are objected to because they do not recite all of the necessary steps of the method claims. Correction is required.

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***Claim Rejections***

***Claim Rejections - 35 USC § 112***

Claims 1-24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Correction or clarification is required.

In claim 1, the recitation “the capacitors” on line 8 and 15 and “The output” on line 10 lacks clear antecedent basis. The recitation “a tuning voltage” on line 16" is confusing because it is unclear if this is additional “voltage” of a further recitation of the previously claimed voltage” on line 7.

In claim 2, the recitation “the tunable capacitors” lacks clear antecedent basis. Also, it is unclear how the capacitors can be based on varactors and where the varactors come from. The same is true for claim 3.

In claim 4, the recitation “the inductors” lacks antecedent basis. It is unclear where the inductors come from and how the inductors can be based on the on-chip spiral inductors. The same is true for claim 5.

In claim 6, the recitation “the phase-locked looped”, “the value” on line 2 and “the loop filter output” on line 3 lacks clear antecedent basis. Also, it is unclear what the “looped” and “value” are, how the looped can be powered since no means for performing the powering down function is recited and how the value can continue to tune the main L-C filter since tuning this filter is performed by the tuning voltage as recited on line 16 of claim 1.

In claim 14, the recitation “the circuits” lacks clear antecedent basis. It is unclear what they are and where they come from. The same is true for claims 15-16 and 23-24.

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In claim 16, it is not understood what the “other semiconductor process technologies” are.

In claim 19, the recitation “the number” lacks clear antecedent basis and the recitation “capacitor elements” on line 2 is confusing because it is unclear if this is additional “capacitor elements” or further recitation of the previously claimed “capacitors” on line 15 of claim 1. The same is true for reciting “the number” in claims 20-21.

In claim 22, it is unclear what the “multiple L-C filter networks” are, where they come from and how the circuits can control them.

In claim 23, it is unclear how the circuit can be “fully differential” and how this limitation is read on the preferred embodiment or seen on the drawings. The same is true for claim 24.

The remaining claims are dependent from the above claims and therefore also considered indefinite.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-16 and 18-24 are rejected under 35 USC 103 (a) as being unpatentable over Meyer et al (US 6,307,442) in view of Wilhelmsson et al (US 6,353,647) and further in view of Geissler et al (US 4,835, 481).

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Meyer et al discloses in Figures 3 and 5 a tunable filter comprising:

- a phase locked loop (24);
- a voltage-controlled oscillator (64) based on an L-C resonant circuit (16, 18, 20, 62); and
- a L-C filter network (66) comprising a tunable main L-C filter wherein the capacitors in the filter are controlled by a tuning voltage that is used to tune the voltage-controlled oscillator (66).

However, Meyer et al does not disclose that the phase locked loop circuit is the digital phase locked loop comprising a digital loop filter, a divider and a digital to analog converter as recited in claim 1, the tunable capacitors are based on MOS capacitors, the inductors are based on chip spiral inductors as recited in claim 4, inductors are based on bonding wires as recited in claim 5, the main L-C filter is a ladder type as recited in claim 7, the main L-C filter is a two-pole resonant circuit as recited in claim 8, the main L-C filter is used in a radio frequency system as recited in claim 13, the circuits are implemented in a CMOS technology as recited in claim 15, the circuits are implemented in a bipolar technology as recited in claim 16, and the tuning voltage is used to control multiple L-C filter networks. For example, the phase locked loop (PLL) of Meyer et al is the analog PLL not the digital phase locked loop as claimed.

Nevertheless, Milhelmsson et al teaches in Figures 4 and 10 a digital phase locked loop comprising a digital phase detector (2D), a digital filter (44), a digital to analog converter (3) for providing very fast acquisition, low output phase jitter and stability.

Geissler et al teaches in Figure1 a digital PLL circuit comprising a divider T3 in the feedback loop for reducing the output frequency so that the output frequency would be matched to the reference frequency.

It would have been obvious to a person having skill in the art at the time the invention was made to employ the digital phase locked loop taught by Milhelmsson et al in the circuit of Meyer et al for the purpose of providing fast acquisition, low output phase jitter and stability, and employ the divider circuit taught by Geissler et al in the circuit of Meyers et al for the purpose of matching the output frequency to the reference frequency.

Also, a skilled artisan realizes that, as well known in the art, filter can be formed in different types such as ladder type or transverse type, the order of filter is determined by number poles (number of inductor and capacitors formed the filter) which determines the passband of the filter. The circuit of Meyers et al includes semiconductor components so that it can implemented in the CMOS technology for reducing power consumption or the bipolar technology for increase the operating speed. The inductors can be formed by a chip inductor or a piece of ribbon wire, and the capacitors can be formed by CMOS transistors for easily being fabricated on an IC, and the control signal in Figure 5 of Meyers can be used to tune more filters depending upon a particular environment or the application in which the modified circuit of Meyer et al is to be used. Lacking of showing any criticality, it would have been obvious to person having skill in the art at the time the invention was made to select the filter type, the number of inductors, capacitors and resistors (filter order), the inductor type of the modified circuit of Meyers et al, or use the control signal to tune more filters as claimed for the purpose of accommodating with the requirement of a specification of a predetermined system in which the modified circuit of Meyers is to be used.

- With regard to claim 2, wherein the tunable capacitors (18, 74) are the varactors.



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- With regard to claim 6, the phase-locked loop of Meyer et al obviously can be powered down because the PLL is powered by a DC supply source. The value of the loop filter output can continue to tune the main L-C filter as shown in Figure 5.
- With regard to claims 9-12, the filter of Meyer et al can be selected in the group of a low-pass filter, a high-pass filter, a band-pass filter or a band-stop filter, see lines 14-50, column 3.
- With regard to claims 23-24, the circuits of Meyer et al can be fully differential or single-ended, see lines 50-55, column 3.

Claim 17 is rejected under 35 USC 103 (a) as being unpatentable over Meyer et al (US 6,307,442) in view of Wilhelmsson et al (US 6,353,647) further in view of Geissler et al (US 4,835, 481) and Donnelly et al (US 6,125,157).

Meyers et al in view of Wilhelmsson et al and Geissler et al discloses a circuit with all of the limitations of the base claim as stated above but does not disclose that the digital counter is used. Donnelly et al teaches in Figure 3 a digital phase locked loop comprising a counter (240) for permitting the loop to quickly re-acquire a locked condition, see lines 35-43, column 4.

It would have been obvious at the time the invention was made to employ the counter taught by Donnelly et al in the modified circuit of Meyers et al for the purpose of permitting the loop to quickly re-acquire a locked condition.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the

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examiner should be directed to DINH T. LE whose telephone number is (571) 272-1745. The examiner can normally be reached on Monday-Friday (8AM-7PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, TIMOTHY CALLAHAN can be reached at (571) 272-1740.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Dinh Le

Primary Examiner

